

**FINAL SURVEY REPORT:
ERGONOMICS INTERVENTIONS
FOR SHIP CONSTRUCTION PROCESSES**

at

**HALTER MOSS POINT SHIPYARD
Moss Point, Mississippi**

REPORT WRITTEN BY:

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Public Health Service
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PLANT SURVEYED:	Halter Moss Point Shipyard, Halter Marine Group, Inc. Moss Point, Mississippi.
SIC CODE:	3731
SURVEY DATE:	November 29-30, 1999
SURVEY CONDUCTED BY:	Stephen D. Hudock Steven J. Wurzelbacher
EMPLOYER REPRESENTATIVES:	as of 11/99: Mike Davis, Corporate Safety Director Bobby Howell, Plant Manager Halter Moss Point Shipyard Bill Williams, Process Improvement Team Jake Winstead, ABC Process Improvement Emerald Smith, Safety Manager, Moss Point Division Bob Dearth, Safety / Environmental Manager
EMPLOYEE REPRESENTATIVES CONTACTED:	Not applicable, non-union facility

DISCLAIMER

Mention of company names and/or products does not constitute endorsement by the Centers for Disease Control and Prevention (CDC).

ABSTRACT

A pre-intervention quantitative risk factor analysis was performed at various shops and locations within Halter Marine, Inc. Moss Point Shipyard, to identify and quantify ergonomic risk factors that workers may be exposed to in the course of their normal work duties. The application of exposure assessment techniques provided a quantitative analysis of the risk factors associated with the individual tasks. Based on these analyses and a review of safety management practices, three ergonomic interventions were suggested for the Halter Marine Shipyard: 1) a computerized injury tracking system for use in the Halter safety, workers compensation, and administrative departments, 2) a shear press lift table for the east side fabrication shop, and 3) a gator bar tool re-design for the angle iron positioning process in the steelyard. This report documents the actions associated with the intervention suggestions.

I. INTRODUCTION

IA. BACKGROUND FOR CONTROL TECHNOLOGY STUDIES

The National Institute for Occupational Safety and Health (NIOSH) is the primary Federal agency in occupational safety and health research. Since 1976, NIOSH has conducted a number of assessments of health hazard control technology on the basis of industry, common industrial process, or specific control techniques. The objective of each of these studies has been to document and evaluate effective control techniques for potential health hazards in the industry or process of interest, and to create a more general awareness of the need for or availability of an effective system of hazard control measures. Initially, a series of walk-through surveys are conducted to select plants or processes with effective and potentially transferable control technology concepts or techniques. Next, in-depth surveys are conducted to determine both the control parameters and the effectiveness of these controls. The reports from these in-depth surveys are then used as a basis for preparing technical reports and journal articles on effective hazard control measures. Ultimately, the information from these research activities will build a database of publicly available information on hazard control techniques for use by health professionals who are responsible for preventing occupational illness and injury.

IB. BACKGROUND FOR THIS STUDY

The background for this study may be found in two previous reports, “Preliminary Survey Report: Pre-Intervention Quantitative Risk Factor Analysis for Ship Construction Processes at Halter Moss Point Shipyard, Moss Point, Mississippi,” Report No. EPHB 229-12a, by Hudock and Wurzelbacher, 2001 and “Interim Survey Report: Recommendations for Ergonomics Interventions for Ship Construction Processes at Halter Moss Point Shipyard, Moss Point Mississippi,” Report No. EPHB 229-12b, by Wurzelbacher et al, 2001. Both reports are available on the NIOSH website at www.cdc.gov/niosh/ergship/reports.html.

IC. BACKGROUND FOR THIS SURVEY

Halter Marine, Inc. Moss Point Shipyard was selected for a number of reasons. It was decided that the project should look at a variety of yards based on product, processes and location. Halter Marine, Inc. had a number of shipyards along the Gulf Coast that differ in work process and product. Some of the Halter yards focused on new construction, others on repair services. Halter Marine, Inc. was a member of the Shipbuilders Council of America.

II. PLANT AND PROCESS DESCRIPTION

IIA. INTRODUCTION

Plant Description: The Halter Moss Point shipyard is located in Moss Point Mississippi. The facility consists of approximately 58 acres of property with 61,500 square feet of shops, offices and warehouses and 60,165 square feet of outside concrete construction platforms. The facility had six crawlers cranes and six track mounted gantry cranes. The yard has the capacity to build vessels up to 400 foot length 85 foot beam, 18 foot water depth, and 85 foot height. At the time of the site visit, three off-shore service vessels (OSV's) for the Gulf oil drilling industry were in various stages of construction. Also, a special-purpose vessel for the U.S. National Aeronautics and Space Administration was under construction. This vessel will be used for the recovery of the space shuttle rocket boosters after each launch of the shuttle.

Corporate Ties: Shortly after the initial walk-through survey was completed, Halter Marine, Inc., was bought by Friede Goldman, and became part of Friede Goldman Halter, Inc. In July 2002, Vision Technologies Kinetics, Inc. (VTK), a wholly owned subsidiary of Singapore Technologies Engineering, Ltd., purchased Halter Marine.

Products: Halter Marine produces offshore supply vessels for the oil drilling industry, ocean-going tank barges and tug boats, excursion and gaming vessels, oceanographic and hydrographic research ships, logistic support vessels, and various small military interdiction craft. Halter Marine recently started work on a new Enhanced Logistic Support Vessel (ELSV) for the U.S. Army's Tank and Automotive Command. Halter Marine has also begun construction of a state-of-the-art Fishing Research Vessel for the U.S. National Oceanographic and Atmospheric Administration.

Age of Plant: Halter Marine Moss Point yard has been functioning as a shipyard since 1993.

Number of Employees, etc: The Moss Point shipyard, as of the date of the survey, had 416 full-time Halter employees and 174 contract workers on site. Prior to 1997, there were fewer than 50 contract workers within the yard. In 1998, a new contractor was hired and, in general, filled the less-skilled production positions. Average annual employment historically has been approximately 400 workers.

IIB. SELECTED PROCESS DESCRIPTIONS

IIB1. Angle Iron Positioning by Gator Bar Worker in Steelyard

Prior to use in any sub-assembly, the raw steel stock must be sandblasted to remove rust or other residual material on the surface of the steel. Angle irons are delivered to the spraying platform in bundles by a mobile crane. The angle irons are dropped onto the platform and are then positioned across the platform as necessary by the gator bar worker and helper.

The most common trades employed as gator bar workers are shipfitters and sandblasters. Angle irons are adjusted into place by the gator bar worker using their hands or a gator pry bar to grip the angle irons. While positioning and flipping angle irons for abrasive blasting, the gator bar worker experiences a number of musculoskeletal risk factors. These risk factors include awkward postures such as extreme lumbar flexion, as well as excessive loads to low back and shoulders.

IIB2. East Side Fabrication Shop Shear Operation

The primary process for the shear operator is to cut steel plate to various dimensions as required for hulls and subassemblies. The particular process flow for the shear is as follows:

- 1) raw plates are moved from pallets to the shear by jib crane that sits between stations
- 2) long plates are laid across an array of roller bearing supports to hold weight of plate while being sheared, and
- 3) cut plates are dropped at the back of the shear onto a sloped tray that reaches to ground level. Smaller pieces may not slide to the bottom of the tray and must be hooked and slid to the bottom by the shear operator,
- 4) cut plates are either manually lifted or lifted by jib crane and placed into containers.

The most common trades working as shear operators are machinists and shipfitters. Shear operators often lift awkward loads from the ground-level shear chutes and material supply pallets. Contact stresses experienced by the shear operator include kneeling on the floor to get material and contact with the sharp edges of the raw or cut material.

III. CONTROL TECHNOLOGY

The following section presents various ergonomic interventions that were suggested for implementation in the Halter Moss Point yard. These suggestions were based on the risk factor analysis and a review of safety management practices that was performed at Halter in November of 1999 and detailed in the Preliminary Survey Report (Hudock and Wurzelbacher, 2001, Report No. EPHB 229-12a) and the Interim Survey Report (Wurzelbacher et al, 2001, Report No. EPHB 229-12b). Both reports are available at <http://www.cdc.gov/niosh/ergship/reports.html>.

IIIA . INJURY TRACKING SYSTEM INTERVENTION FOR USE IN THE SAFETY, WORKERS COMPENSATION, AND PRODUCTION HOUR REPORTING DEPARTMENTS

Developing cost justifications for ergonomic interventions at Halter Moss Point was difficult due to the fact that the current injury database collected only OSHA 200 information and included only a breakdown of production hours for the total yard. The reduction of musculoskeletal injuries throughout the Halter Moss Point yard may be greatly facilitated by the implementation of a computerized injury tracking system that integrates safety data workers compensation data, and production hour reporting and which is also based on the Bureau of Labor Statistics (BLS) injury reporting method.

The collection of data for every injury and illness improves the ability of a safety team to track problem occupational tasks within the yard that pose excessive risk for not only musculoskeletal disorders, but all injuries in general. The data can also be used for comparison against published BLS rates for the shipbuilding and repair industry (SIC Code 3731) to further monitor the yard's progress. Once individual safety personnel have been properly trained, the additional time to collect these data becomes minimal.

The next step is to establish a communications link between the worker's compensation and production hour reporting databases at Halter and the new injury database so that incidence rates and costs per production hour can be calculated for individual departments. At a minimum, production hours should be provided to the safety department at least monthly and updated medical costs should be provided on a regular basis until approximately two years after the date of initial injury. If possible, the computer systems within the yard should be integrated to provide continual updating of this information.

IIIB. POSSIBLE INTERVENTION FOR THE EAST SIDE FABRICATION SHOP SHEAR OPERATION

The primary concern for the east side fabrication shop shear operator or helper is the constant bending at the waist or kneeling to pick up material from the back of the shear at floor level. One possible solution is to provide an adjustable lift table for the shear chute at the back of the machine. When the worker needs to remove material from the chute, the lift table could be elevated, allowing the worker to transfer cut material to the lift table at approximately waist height. This would eliminate the need for the worker to lift objects off the rear chute at near floor level.

IIIC. POSSIBLE INTERVENTIONS FOR THE STEELYARD ANGLE IRON POSITIONING PROCESS

The principal hazards associated with the angle iron positioning process are the excessive upper extremity force and flexed back posture required to invert and pull the angle irons using the current gator bar tool. Possible interventions include using a mobile crane to spread the stack of angle irons across the platform when dropped and automating some of the processes to eliminate the pulling of angle irons into position across the platform. The entire flipping area could also be placed on a lift table and raised when the angle irons needed to be inverted.

Additionally, inexpensive and simple alterations to the gator bar tool may also reduce the amount of back flexion and effort required to separate and flip individual pieces of long angle irons. For reasons of cost-effectiveness, these tool changes were the principal suggested interventions for the angle positioning process.

IV. IMPLEMENTED INTERVENTIONS

At this time it is not known whether any of the suggested interventions have been implemented at Halter Moss Point. There has been no request from the company for available funds to assist in the procurement of suggested items. Upon further follow-up, it was determined that the project contact from the Corporate Safety Department is no longer with the company, nor is the local shipyard safety contact. This facility has been purchased twice since the beginning of this intervention project.

V. CONCLUSIONS

Based on ergonomic task analyses and a review of safety management practices, three ergonomic interventions were suggested for the Halter Moss Point Shipyard: 1) A computerized injury tracking system for use in the Halter safety, workers compensation, and administrative departments, 2) a shear lift table for east side fabrication shop, and 3) a gator bar tool re-design for the angle iron positioning in the steel yard. Of these interventions, it was expected that the development of the injury tracking database would have a significant impact on reducing musculoskeletal injuries through the identification and prioritization of intervention efforts.

The impact of any further ergonomic changes interventions cannot be fully assessed until such a tracking system is in place. However, the implementation of engineered ergonomic interventions has been found to reduce the amount and severity of musculoskeletal disorders within the working population in various industries. Other ergonomic interventions may also be implemented at Halter Marine Moss Point shipyard to minimize hazards in the identified job tasks.

Each of the interventions proposed in this document are to be considered preliminary concepts. Full engineering analyses by the participating shipyard are expected prior to the implementation of any particular suggested intervention concept to determine feasibility, both financial and engineering, as well as to identify potential safety considerations.

VI. REFERENCES

- Hudock, S. D. and S. J. Wurzelbacher. 2001. Preliminary Survey Report: Pre-Intervention Quantitative Risk Factor Analysis for Ship Construction Processes at Halter Moss Point Shipyard, Moss Point, Mississippi. U.S. Department of Health and Human Services, Public Health Service, Centers for Disease Control and Prevention, National Institute for Occupational Safety and Health, Cincinnati, Ohio, Report # EPHB 229-12a, August 2001, 40 pp. Available at www.cdc.gov/niosh/ergship/reports.html.
- Wurzelbacher, S. J., S. D. Hudock, and O. E. Johnston. 2001. Interim Survey Report: Recommendations for Ergonomics Interventions for Ship Construction Processes at Halter Moss Point Shipyard, Moss Point, Mississippi. U.S. Department of Health and Human Services, Public Health Service, Centers for Disease Control and Prevention, National Institute for Occupational Safety and Health, Cincinnati, Ohio, Report # EPHB 229-12b, August 2001, 21 pp. Available at www.cdc.gov/niosh/ergship/reports.html.